

## PATENT ABSTRACTS OF JAPAN

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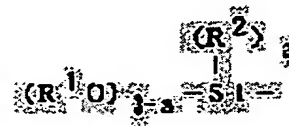
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## (54) HYDROPHILIC CURABLE COMPOSITION AND ITS PRODUCTION

## (57)Abstract:

PURPOSE: To obtain the subject composition excellent in surface hardness, adhesion and durability and useful for top coat, etc., by copolymerizing a specific alkoxyethyl group-containing monomer with an acrylic monomer in the presence of a tetraalkylsilicate, etc.

CONSTITUTION: (B) An alkoxyethyl group-containing monomer containing a group of the formula [R1 is 1-10C alkyl; R2 is H, 1-10C alkyl, aryl or aralkyl; (a) is 0-2], e.g.  $\gamma$ -methacryloxypropyltrimethoxysilane is copolymerized with (C) an acrylic monomer such as methyl (meth)acrylate in the presence of (A) a tetraalkylsilicate such as tetramethylsilicate and/or its condensate to provide the objective composition. Furthermore, the component A and the copolymer of these components B and C are preferably blended in a ratio of 2-60 pts.wt. component A with 100 pts.wt. copolymer.



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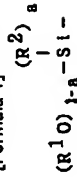
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## CLAIMS

[Claim(s)]

[Claim 1](A) A general formula;

[Formula 1]



the inside of a formula, and R<sup>1</sup> --- the alkyl group of the carbon numbers 1-10, and R<sup>2</sup> --- a hydrogen atom or the alkyl group of the carbon numbers 1-10. The univalent hydrocarbon group chosen from the group which consists of an aryl group and an aralkyl group, a --- 0, 1, or 2 --- being shown --- the hydrophilic hardenability constituent which consists of alkoxy-silyl-groups content acrylic copolymer 100 weight section containing the basis expressed, (B) tetraalkyl silicate and/or its condensate 2 - 60 weight sections, and a (C) curing catalyst.

[Claim 2]The hydrophilic hardenability constituent according to claim 1 which is a polymer containing 5 to 90% of the weight of an alkoxy-silyl-groups content monomer while the aforementioned (A) ingredient contains a polymerization nature double bond in intramolecular.

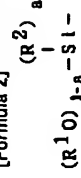
[Claim 3]The hydrophilic hardenability constituent according to claim 1 or 2 whose aforementioned (C) ingredient is an acid curing catalyst.

[Claim 4]The hydrophilic hardenability constituent according to claim 3 in which said acid curing catalyst is an acid anhydride of a mixture of alkyl acid phosphate, alkyl acid phosphate, and amine or a reactant, saturation or unsaturation polyvalent carboxylic acid, saturation, or unsaturation polyvalent carboxylic acid.

[Claim 5]A hydrophilic hardenability constituent given in any 1 paragraph of claims 1-4 by which methacrylic acid n butyl is contained in the aforementioned (A) ingredient as a copolymerization monomer.

[Claim 6]Under existence of tetraalkyl silicate and/or its condensate, it is a general formula;

[Formula 2]



the inside of a formula, and R<sup>1</sup> --- the alkyl group of the carbon numbers 1-10, and R<sup>2</sup> --- a hydrogen atom or the alkyl group of the carbon numbers 1-10. the univalent hydrocarbon chosen from the group which consists of an aryl group and an aralkyl group, and a --- 0, 1, or 2 --- being shown --- the manufacturing method of the hydrophilic hardenability constituent carrying out copolymerization of the alkoxy-silyl-groups content monomer containing the basis expressed, and the acrylic system monomer.

[Translation done.]

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## DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001] [Industrial Application] This invention relates mainly to a hardenability constituent for top coat used for metal, ceramics, glass, cement, a ceramic industry system molded product, a plastic, wood, paper, textiles, the construction exterior, a household appliance article, industrial machinery, etc., and a manufacturing method for the same about a hydrophilic hardenability constituent and a manufacturing method for the same.

[0002] [Description of the Prior Art] Conventionally, the constituent containing acrylic silicon resin was covered on the surface of industrial products, such as a ceramic industry system raw material, steel, construction, and building materials. The high hardness film was also able to form that the design effect can be given to said industrial product in the surface with last thing, and, thereby, it was able to raise physical properties, such as the weatherability of said industrial product, and corrosion resistance. [0003] If it is furthermore in today, it is socially required for the following reasons that hydrophilic nature should be given to a membrane surface. That is, for example, contamination of the building has been a problem centering on the city part. However, by improving surface wettability, the pollutant adhering to the surface can be washed with storm sewage etc., and the resistance to contamination of said building can be raised.

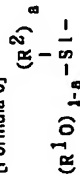
[0004] Although it could realize by the method of adding a surface-active agent to said constituent, in a giving hydrophilic characteristic, the fall of surface hardness was caused, or there was a problem in the hydrophilic maintenance by the outdoor exposure over a long period of time, and it was not a still satisfying method.

[0005] This invention is made in view of the above-mentioned actual condition, and even if it carries out an outdoor exposure over a long period of time, the purpose is in the place which provides the hydrophilic hardenability constituent which can hold hydrophilic nature, while having the outstanding surface hardness.

[0006] [Means for Solving the Problem] A hydrophilic hardenability constituent of this invention is the (A)

general formula:

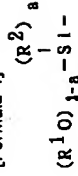
[Formula 3]



the inside of a formula, and R<sup>1</sup> — the alkyl group of the carbon numbers 1-10, and R<sup>2</sup> — a hydrogen atom. Or the univalent hydrocarbon group chosen from the group which consists of the alkyl group, aryl group, and aralkyl group of the carbon numbers 1-10, a — 0, 1, or 2 — being shown — it consists of alkoxy-silyl-groups content acrylic copolymer 100 weight section (only henceforth a "part") containing the basis expressed, (B) tetraalkyl silicate and/or its condensate 2 - 60 copies and the (C) curing catalyst.

[0007] An alkoxy-silyl-groups content acrylic copolymer (the following and "an alkoxy-silyl-groups content acrylic copolymer (A)" — or it is also only called "(A) ingredient") of the (A) ingredient which is one ingredient in a constituent of this invention — general formula:

[Formula 4]



It is a polymer which comes out and has preferably two or more alkoxy silyl groups expressed in [ at least one ] one molecule. This alkoxy silyl groups may be contained at the end of the main chain of the (A) ingredient, may be contained in a side chain, and may be contained to both sides.

[0008] (A) The solvent resistance of the hardened material (for example, coat) in which the number of the alkoxy silyl groups in one molecule of ingredients is obtained from the constituent of this invention by less than one piece falls easily.

[0009] the inside of said formula, and R<sup>1</sup> — the carbon numbers 1-10 — it is an alkyl group of 1-4 preferably, if a carbon number exceeds 10, the reactivity of alkoxy silyl groups falls, and also when R<sup>1</sup> is a phenyl group and benzyl, for example except an alkyl group, reactivity will fall.

[0010] As an example of R<sup>1</sup>, a methyl group, an ethyl group, an isopropyl group, an isobutyl group, an isobutyl group, etc. are mentioned, for example.

[0011] R<sup>2</sup> is a hydrogen atom or the carbon numbers 1-10, and the univalent hydrocarbon group preferably chosen from a group which consists of an alkyl group of 1-4, an aryl group, and an aralkyl group among said formula.

[0012] The same basis as R<sup>1</sup> is raised as an example of an alkyl group which is R<sup>2</sup>, a phenyl group etc. are mentioned as an example of an aryl group, for example, and benzyl etc. are mentioned as an example of an aralkyl group, for example.

[0013] A basis contained in an alkoxy-silyl-groups content monomer mentioned later, for example as an example of alkoxy silyl groups expressed with said general formula [the-izing 4] is mentioned.

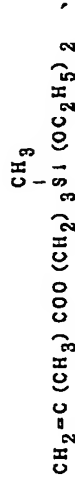
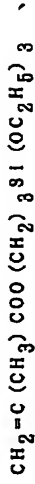
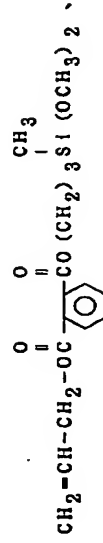
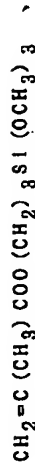
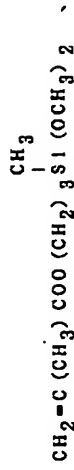
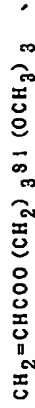
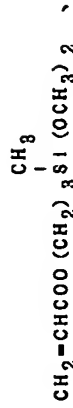
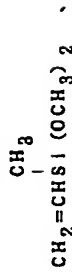
[0014] Since the main chain consists of an acrylic copolymerization chain substantially, an alkoxy-silyl-groups content acrylic copolymer (A) is excellent in the weatherability of a hardened material, chemical resistance, a water resisting property, etc. In the (A) ingredient, if alkoxy silyl groups has combined with a carbon atom, the water resisting property of a hardened material obtained will become the further outstanding thing, and will become what was excellent in alkali resistance, acid resistance, etc.

[0015] As for a number average molecular weight of an alkoxy-silyl-groups content acrylic copolymer (A), 1,000-30,000 are preferred from a point of physical properties, such as the endurance etc. of a hardened material obtained from a constituent of this invention, and 3,000-25,000 are still more preferred.

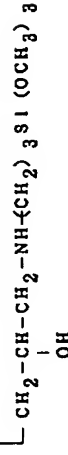
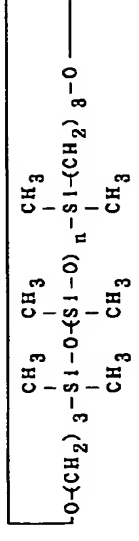
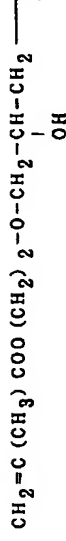
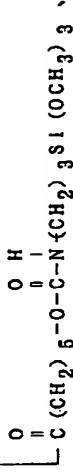
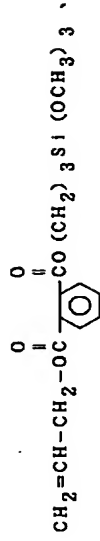
[0016] (A) An ingredient can be obtained, for example by copolymerization of acrylic system monomers, such as acrylic acid, methacrylic acid, and those derivatives, and an alkoxy-silyl-groups content monomer.

[0017] There is no limitation in particular in an acrylic system monomer, and as the example, Methyl (meta) acrylate, ethyl (meta) acrylate, butyl (meta) acrylate, 2-ethylhexyl (meta) acrylate, stearyl (meta) acrylate, Benzyl (meta) acrylate, cyclohexyl (meta) acrylate, Trifluoroethyl (meta) acrylate, pentafluoropropyl (meta) acrylate, Perfluorocyclohexyl (meta) acrylate, acrylonitrile (meta), Glycidyl (meta) acrylate, dimethylaminoethyl (meta) acrylate, Diethylaminoethyl (meta) acrylate, acrylamide (meta), alpha-ethyl(meta) acrylamide, N-butoxymethyl(meta) acrylamide, N,N-dimethylacrylamide, N-methylacrylamide, acryloyl morpholine, 2-hydroxyethyl (meta) acrylate, 2-hydroxypropyl (meta) acrylate, AS-6 which are ARONIKUSU M-5700 made from N-methylol(meth)acrylamide and Toagosei Chemical industry, and a macro monomer made from Toagosei Chemical industry, AN-6, AA-6, AB-6, Placel by AK-5 and Daicel Chemical Industries, Ltd. FA-1, Placel FA-4, and Placel. The hydroxy alkyl ester of alpha, such as FM-1, Placel FM-4, and hydroxy alkyl ester of acrylic acid (meta), and beta-ethylenic unsaturated carboxylic acid, phosphoric acid, or a condensation product sleek phosphoester group content vinyl system compound of phosphoric ester, Acrylate including a urethane bond and a siloxane bond (meta) are mentioned.

[0018] There is no limitation in particular except [ of having a polymerization nature double bond as said alkoxy-silyl-groups content monomer ] — as the example — for example [Formula 5]



[Formula 6]



(nは、0~10の整数である。)

\*\*\*\* is mentioned and the acrylate etc. which have alkoxy silyl groups via a urethane bond or a siloxane bond at the end (meta) are contained.

[0019](A) 5 to 90% of the rate of the alkoxy-silyl-groups content monomer in an ingredient is desirable from points, such as the hardenability of a constituent, and the endurance of a coat, and is still more desirable. [ 10 to 70% of ]

[0020](A) in the ingredient, the segment formed in the main chain of the urethane bond or the siloxane bond may be included in the range which does not surpass 50%, and the segment originating in monomers other than an acrylic acid derivative (meta-) may be included. There is no limitation in this monomer and as that example, for example Styrene, Alpha-methylstyrene, chlorostyrene, styrene sulfonic acid, 4-hydroxystyrene, Aromatic hydrocarbon system vinyl system compounds, such as vinyltoluene; Maleic acid, Unsaturated carboxylic acid, such as fumaric acid and itaconic acid, those salts (alkali metal salt, ammonium salt, amine salt, etc.), those acid anhydrides (maleic anhydride etc.), Or ester of unsaturated carboxylic acid, such as diester with the straight chain of them and the carbon numbers 1-20, or alcohol of branching, or half ester; Vinyl acetate, Vinyl ester and allyl compounds, such as vinyl propionate and diallyl phthalate; Vinylpyridine, Amino group content vinyl system compounds, such as aminoethyl vinyl ether; Itaconic acid diamide, Amide group content vinyl system compound, 2-hydroxyethyl vinyl ether, such as croton amide, maleic acid diamide, fumaric acid diamide, and N-vinyl pyrrolidone, The methyl vinyl ether, cyclohexyl vinyl ether, VCM/PVC, a vinylidene chloride, chloroprene, propylene, butadiene, isoprene, fluoroolefin maleimide, N-vinylimidazole, The vinyl system compound of others, such as vinylsulfonic acid, etc. are mentioned.

[0021] Although an alkoxy-silyl-groups content acrylic copolymer (A) can be manufactured by a method shown in JP 54-36395A, a 57-36109 gazette, etc., for example, it is most preferred to manufacture by a solution polymerization method using azo radical initiators, such as azobisisobutyronitrile, from points, such as a composite ease.

[0022] Also set and if needed In this case, n-dodecyl mercaptan, t-dodecyl mercaptan, n-butyl mercaptan, gamma-mercapto propyltrimethoxysilane, gamma-mercapto propyltriethoxysilane, gamma-mercapto propylmethyldimethoxysilane, A molecular weight can be adjusted using chain transfer agents,

such as gamma-mercaptopropylmethyl diethoxysilane and  $\text{3(CH}_3\text{O)}_2\text{Si-S-Si(CH}_3\text{O)}_3$ . It is preferred for a reason for the ability to introduce alkoxy silyl groups into an end of a silyl group content acrylic copolymer to use a chain transfer agent which has especially alkoxy silyl groups in a molecule, for example, gamma-mercaptopropyltrimethoxysilane.

[0023]A polymerization solvent used for said solution polymerization method, Hydrocarbon (toluene, xylene, n-hexane, cyclohexane, etc.), acetate ester (ethyl acetate, butyl acetate, etc.) and ether (ethylcellosolve.) If butyl cellosolve, a cellosolve acetate, etc. are the nonresponsive solvents like ketone (methyl ethyl ketone, ethyl acetacetate, an acetylacetone, methyl isobutyl ketone, acetone, etc.), there will be no limitation in particular.

[0024]One sort may be used for such an alkoxy-silyl-groups content polymer (A), and it may use two or more sorts together.

[0025]It is desirable to introduce 20-50 copies of methacrylic acid n butyl as a copolymerization monomer in the (A) ingredient from a point of tetraalkyl silicate of the (B) ingredient and/or compatibility with the condensate.

[0026]Tetraalkyl silicate of the (B) ingredient used for this invention and/or its condensate raise hydrophilic nature and hardness of a cured film which are produced by painting a constituent, or raise the adhesion of a coat and a substrate.

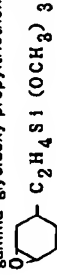
[0027]As tetraalkyl silicate, tetramethyl silicate, tetraethyl silicate, tetra-n-propylsilicate, tetra-i-propylsilicate, tetra-n-butylsilicate, etc. can be mentioned.

[0028]It is generable with a known manufacturing method of obtaining it by making the above-mentioned tetraalkyl silicate condensing under a hydrolysis condition as a condensate of tetraalkyl silicate. That is, it can carry out by making tetraalkyl silicate add and condense water. A commercial item can also be used for a tetraalkyl silicate condensate. As such a condensate, there are MS151, ES128, ES140 (all are made in Col Coat), etc., for example.

[0029]When the above-mentioned tetraalkyl silicate and/or its condensate may be mixed for the (A) ingredient and the (A) ingredient is compounded (i.e., when carrying out copolymerization of an alkoxy-silyl-group content monomer and the acrylic system monomer), the (B) ingredient can also be made to exist in a reaction vessel beforehand. If a latter method is taken, compatibility and hydrophilic nature will be improved.

[0030]The number of 2-60 copies of blending ratios of the above-mentioned tetraalkyl silicate is 5-40 preferably to 100 copies of pitches of an ingredient (A). There is a problem of less than two copies not being enough as the hydrophilic nature of a hardened material obtained, appearance in a hardened material getting worse if it exceeds 60 copies, or becoming easy to generate a crack.

[0031]As an example of a curing catalyst (the following and "a curing catalyst (C)" — or it is also only called "(C) ingredient") which is the (C) ingredient used for this invention, Dibutyltin dilaurate, dibutyltin malate, dioctyltin laurate, Organotin compounds, such as dioctyltin malate and octylic acid tin, phosphoric acid, Monomethyl phosphate, monoethyl phosphate, monobutyl phosphate, Mono- octyl phosphate, monododecyl phosphate, dimethyl phosphate, Diethyl phosphate, dibutyl phosphate, dioctyl phosphate, Phosphoric ester, such as didecyl phosphate; Propylene oxide, Butylene oxide, cyclohexene oxide, glycidyl methacrylate, Glycidol, acrylic glycidyl ether, gamma-glycidoxypolytrimethoxysilane, gamma-glycidoxypolytriethoxysilane, gamma-glycidoxypoly methyl dimethoxysilane, [Formula 7]



Epoxy compounds, such as car DEVURAE made from Oil recovery Shell Epoxy. Epicoat 828 made from Oil recovery Shell Epoxy, and Epicoat 1001, phosphoric acid, and/or an addition reaction thing with monoalkyl acid phosphate, Acidic compounds, such as maleic acid, adipic acid, azelaic acid, sebacic acid, itaconic acid, citrate, succinic acid, phthalic acid, trimellitic acid, pyromellitic acid, these acid anhydrides, Para toluenesulfonic acid, and dodecylbenzenesulfonic acid, are mentioned. The mixture or reactant of these acid catalysts and amine is also contained. For example, amines, such as hexylamine, N,N-dimethyldodecyl amine, and dodecyl amine, are mentioned.

[0032]An acid curing catalyst is desirable among these curing catalysts (C), mixture or reactant of activity of alkyl acid phosphate, alkyl acid phosphate, and amine is high, and hydrophilic nature of a reactant is also especially preferred. A curing catalyst (C) may be used independently and may use two or more sorts together.

[0033](C) Although there is no limitation in particular in the amount of ingredient used, 0.1-20 copies are

usually preferred to 100 copies of resin solid content of the (A) ingredient and the (B) ingredient, and 0.1-10 copies are still more preferred. (C) When there is a tendency for hardenability to fall if the amount of ingredient used will be less than 0.1 copy and it exceeds 20 copies, there is a tendency for appearance-of-film nature to fall.

[0034]Even if it carries out repeated use over a long period of time, in order to secure satisfactory preservation stability, it is preferred to use a dehydrator and alkyl alcohol.

[0035]As an example of a dehydrator, for example Methyl orthoformate, ethyl orthoformate, Hydrolytic ester compounds, such as dimethyl acetate, diethyl acetate, methyl trimethoxysilane, gamma-methacryloxypropyl trimethoxy silane, vinyltrimethoxysilane, methylsilicate, and ethyl silicate, are mentioned. Low-molecular-weight alcohol like methanol and ethanol as alkyl alcohol is mentioned. A dehydrator and alkyl alcohol may be added before a polymerization of an alkoxy-silyl-groups content polymer (A), may be added after a polymerization, and may be added during a polymerization.

[0036]Although there is no limitation in particular in the amount of a dehydrator and the alkyl alcohol used, 0.5-20 copies two - ten copies are still more preferred to 100 copies of resin solid content of the (A) ingredient and the (B) ingredient.

[0037]If a dehydrator and alkyl alcohol are used together, an effect remarkable in preservation stability will be seen.

[0038]In a constituent of this invention, according to a use, a diluent, paints (an extender is included), Additive agents, such as an ultraviolet ray absorbent, light stabilizer, an antisepting agent, and a leveling agent; A nitrocellulose, Fibrin, such as cellulose acetate butylate; resin; bulking agents, such as an epoxy resin, melamine resin, vinyl chloride resin, chlorinated polypropylene, chlorinated rubber, and a polyvinyl butyral, etc. may be added.

[0039]After making the above-mentioned constituent a coated object with \*\* with conventional

methods, such as various paint especially immersion, spraying, and brush coating, a coat which was excellent in adhesion, endurance, etc. on the surface of a coated object can be formed by making it usually harden above 30 \*\*.

[0040]

[Example]Hereafter, the hydrophilic hardenability constituent of this invention is explained still more concretely based on an example.

[0041]After carrying out temperature up to 110 \*\*, having taught 40.4 copies of xylene to the reaction vessel provided with synthetic example 1 agitator, the thermometer, the reflux condenser, the nitrogen gas introducing pipe, and the dropping funnel, and introducing nitrogen gas into it, uniform dropping of the mixture (a) of the following presentation was carried out over 5 hours with the dropping funnel.

Mixture (a)

Methyl methacrylate 28.4 copies Methacrylic acid n butyl 47.1 copies Butyl acrylate 11.8 copies

Gamma-methacryloxypropyl trimethoxy silane 11.8 copies 0.9 copy of acrylamide Xylene 17.9 copies 2.2-azobisisobutyronitrile 1.0 copy.

[0042]Uniform dropping of 0.5 copy of 2,2-azobisisobutyronitrile and 8.1 copies of toluene was carried out over 1 hour after the end of dropping of a mixture (a). It cooled after 2-hour aging at 110 \*\* after the end of dropping, xylene was added to the resin solution, and solids concentration was adjusted to 50%. The number average molecular weight of the obtained resin was 15,000.

[0043]After carrying out temperature up to 110 \*\*, having taught 40.4 copies of xylene to the reaction vessel provided with synthetic example 2 agitator, the thermometer, the reflux condenser, the nitrogen gas introducing pipe, and the dropping funnel, and introducing nitrogen gas into it, uniform dropping of the mixture (b) of the following presentation was carried out over 5 hours with the dropping funnel.

Mixture (b)

Methyl methacrylate 56.6 copies Butyl acrylate 30.7 copies Gamma-methacryloxypropyl trimethoxy silane 11.8 copies Acrylamide 0.9 copy Xylene 17.9 copies 2,2-azobisisobutyronitrile 1.0 copy.

[0044]Uniform dropping of 0.5 copy of 2,2-azobisisobutyronitrile and 8.1 copies of toluene was carried out over 1 hour after the end of dropping of a mixture (b). It cooled after 2-hour aging at 110 \*\* after the end of dropping, xylene was added to the resin solution, and solids concentration was adjusted to 50%. The number average molecular weight of the obtained resin was 15,000.

[0045]After carrying out temperature up to 110 \*\*, having taught 30 copies and 10.4 copies of xylene to the reaction vessel provided with synthetic example 3 agitator, the thermometer, the reflux condenser, the nitrogen gas introducing pipe, and the dropping funnel for ES140 (\*), and introducing nitrogen gas into it, uniform dropping of the mixture (c) of the following presentation was carried out over 5 hours with

the dropping funnel. (\* Col Coat tetraethyl silicate condensate commercial item):

[0046]

Mixture (c)

Methyl methacrylate 56.6 copies Butyl acrylate 30.7-copy gamma-methacryloxypropyl trimethoxy silane 11.8 copies Acrylamide 0.9 copy Xylene 17.9 copies 2-azobisisobutyronitrile 1.0 copy.

[0047] Uniform dropping of 0.5 copy of 2,2'-azobisisobutyronitrile and 8.1 copies of toluene was carried out over 1 hour after the end of dropping of a mixture (c). It cooled after 2-hour aging at 110 °C after the end of dropping, xylene was added to the resin solution, and solids concentration was adjusted to 50%. The number average molecular weight of the obtained resin was 15000.

0048]3D copies of MS151 (made in Col Coat) which are the (B) ingredient were blended to 100 copies of resin shown in the example 1 of example 1 composition. Titanium oxide (CR-90 by Ishihara Sangyo Kaisha, Ltd.) was distributed so that it might become 60% of coating solid concentration PWC(paints to total solids comparatively)40% using this resin solution, and white enamel was adjusted. Distribution was performed with the paint conditioner for 2 hours using the glass bead. It diluted so that 0.25 copy might become [ as a curing catalyst ] 45% of solids concentration to said white enamel by thinner in addition to 100 copies of resin solid content respectively about dioctyl phosphate and dodecyl amine.

[0049] This paint was painted with the air spray so that dry membrane thickness might be set to about 30 micrometers to an aluminum board (A5052P). It was recuperated for seven days at 23 °C in the color card after that, and the coat was formed in the surface of said aluminum board. The angle of contact with the degree of brilliancy in this coat, PEROSU hardness, and water and the angle of contact with the water after three-month exposure were measured, respectively. A result is indicated to [Table 2].

[0050] White enamel was adjusted on the above and the conditions, and the composition shown in Example 2 - Example 6 and the comparative example 1 - the comparative example 3 [Table 1] was made into the paint. The curing catalyst similarly shown in [Table 1] was added, and it diluted so that it might become 45% of solids concentration by thinner.

[0051] This paint was painted with the air spray so that dry membrane thickness might be set to about 30 micrometers to an aluminum board (A5052P). The angle of contact with the degree of brilliancy in the coat which recuperated itself and formed the color card after that on the care-of-health conditions shown in [Table 1]. PEROZOSU hardness, and water, and the angle of contact with the water after three-month exposure were measured, respectively. A result is written together to [Table 2].

[0052]

[Table 1]

(

[0053]

[Table 2]

	光沢	ペロソス硬度	接触角	3ヶ月曝露(*) 後の接触角
実施例 1	86	200	48°	48°
実施例 2	84	260	50°	51°
実施例 3	85	170	40°	48°
実施例 4	80	170	45°	50°
実施例 5	84	250	48°	52°
実施例 6	85	160	85°	50°
比較例 1	87	150	86°	72°
比較例 2	65	100	43°	48°
比較例 3	85	80	44°	70°

(\*) 大阪にて南面30° 曝露

[0054]

[Effect of the Invention]While having the outstanding surface hardness with the hydrophilic hardenability constituent of this invention, even if it carries out an outdoor exposure over a long period of time, the coat which can hold hydrophilic nature can be made to form.

[0055]Under existence of tetraalkyl silicate and/or its condensate, if copolymerization of an alkoxy-silyl-groups content monomer and the acrylic system monomer is carried out, the hydrophilic nature of the coat formed with the obtained constituent will improve further.

[Translation done.]